

B1
between the central portion in said heat storage tank and the outside; and

suppressing means for suppressing the natural convection of the heat storage material,
said suppressing means being disposed in the outer portion in the heat storage tank.

REMARKS

Favorable consideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 3, 4 and 6-9 are presently pending in this application, Claims 3 and 6-9 having been withdrawn from further consideration by the Examiner, Claim 4 having been amended by the present amendment.

In the outstanding Office Action, Claim 4 was rejected under 35 U.S.C. §102(b) as being anticipated by Perry et al. (U.S. Patent 4,142,576).

Claim 4 has been amended solely to clarify the subject matter recited therein. Also, this claim amendment to Claim 4 is believed to be merely cosmetic and is not believed to narrow its original scope. If, however, the Examiner disagrees, the Examiner is invited to telephone the undersigned who will be happy to work in a joint effort to derive mutually satisfactory claim language.

Briefly recapitulating, Claim 4 of the present invention is directed to a heat storage device including a heat storage tank charged with a heat transfer medium which also serves as a heat storage material for storing the heat supplied from the outside, a heat transport device which execute an injection and an extraction of heat between the inside of the heat storage tank and the outside by the inflow and the outflow of the heat transfer medium, the heat transport means being disposed so as to execute a heat transport between the central

portion in the heat storage tank and the outside, and suppressing means for suppressing the natural convection of the heat storage material, the suppressing means being disposed in the outer portion in the heat storage tank. By providing such suppressing means, the heat storage material develops the natural convection in the central portion but not in the outer portion of the storage tank, thereby reducing the temperature difference between the surface of the heat storage material and the external environment.¹ As a result, the heat storage device recited in Claim 4 effectively reduces the influence of the external environment upon the inside portion of the heat storage tank and the heat loss toward the outside is significantly suppressed.²

The outstanding Office Action asserts that Perry et al. disclose a heat storage device as recited in Claim 4. Nevertheless, Perry et al. do not teach “suppressing means for suppressing the natural convection of the heat storage material, said suppressing means being disposed in the outer portion in the heat storage tank” as recited in Claim 4. That is, the heat storage material in Claim 4 is maintained in liquid phase at least when heat is injected or extracted. On the other hand, Perry et al. disclose the soil, in which no natural convection takes place, as a heat storage material, and the particles 20 dispersed in the back-fill soil in order to keep high water content by percentage in the soil for a long period and increase thermal conductivity as well as heat capacity of the soil. Also, Perry et al. states that the thermal conductivity of the soil is improved by dispersing a small volume of the particles 20 (the water-filled bags) which is as effective as injecting fluid. It is, however, respectfully submitted that dispersing the water-filled bags is not similar to or as effective as dispersing water. Because even though the water-filled bags are dispersed in the soil, the soil nevertheless behaves as solid as the soil mostly contact with each other solidly and the

¹ Specification, page 12, lines 8-20.

² Id.

movement of water caused by capillarity between the voids in the soil does not take place. Consequently, "suppressing the natural convection" does not make sense where no natural convection in the soil occurs, and the particles 20 cannot have an effect on suppressing the natural convection in the soil, i.e., the heat storage material.

In addition, the promotion of the thermal conductivity described in Perry et al. does not seem effective, since there is no great difference in the thermal conductivity between dry soil and water. In other words, the particles 20 increase heat capacity and have no relation to natural convection.

On those bases, the structure recited in Claim 4 is believed to be clearly distinguishable from Perry et al., and thus is not anticipated nor rendered obvious thereby.

For the foregoing reasons, Claim 4 is believed to be allowable. Furthermore, since Claims 6-9 depend directly from Claim 4, substantially the same arguments set forth above also apply to these dependent claims. Hence, Claims 6-9 are believed to be allowable as well.

In view of the amendments and discussions presented above, Applicant respectfully submits that the present application is in condition for allowance, and an early action favorable to that effect is earnestly solicited.

Finally, the attention of the Patent Office is directed to the change of address of Applicants' representative, effective January 6, 2003:

Oblon, Spivak, McClelland, Maier & Neustadt, P.C.

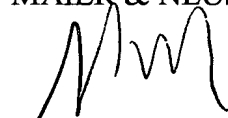
1940 Duke Street

Alexandria, VA 22314.

Please direct all future communications to this new address.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Registration No. 25,599
Robert T. Pous
Registration No. 29,099
Attorneys of Record



22850

Tel: (703) 413-3000

Fax: (703) 413-2220

GJM/RTP/AY:fmw

I:\ATTY\AKY\21s\216369\ame.wpd

Marked-Up Copy

Serial No: 09/995,565

Amendment Filed on:

March 24, 2003

IN THE CLAIMS

Please amend Claim 4 as follows:

--4. (Amended) A heat storage device comprising:

a heat storage tank charged with a heat transfer medium which also serves as a heat storage material for storing the heat supplied from the outside;

a heat transport [means] device which execute an injection and an extraction of heat between the inside of the heat storage tank and the outside by the inflow and the outflow of said heat transfer medium[;], said heat transport means being disposed so as to execute a heat transport between the central portion in said heat storage tank and the outside; and

suppressing means for suppressing the natural convection of the heat storage material, said suppressing means being disposed in the outer portion in the heat storage tank.--